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Cause Specific Mortality In Finnish Forensic Psychiatric Patients

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Abstract

Purpose: To analyze the causes of mortality among patients committed to compulsory forensic psychiatric hospital treatment in Finland during 1980–2009 by categorizing the causes of mortality into somatic diseases, suicides and other unnatural deaths.

Materials and Methods: The causes of mortality were analyzed among 351 patients who died during the follow-up. Standardized Mortality Ratio (SMR) was calculated as the ratio of observed and expected number of deaths by using the subject-years methods with 95% confidence intervals, assuming a Poisson distribution. The expected number of deaths was calculated on the basis of sex-, age- and calendar-period-specific mortality rates for the Finnish population.

Results: The vast majority (249/351) of deaths were due to a somatic disease with SMR of 2.6 (mean age at death 61 years). Fifty nine patients committed suicide with a SMR of 7.1 (mean age at death 40 years). Four patients were homicide victims (mean age at death 40 years) and 32 deaths were accidental (mean age at death 52 years). The combined homicides and accidental deaths resulted in a SMR of 1.7.

Conclusions: The results of this study point out that the high risk for suicide should receive attention when the hospital treatment and the outpatient care is being organized for forensic psychiatric patients. In addition, the risk of accidents should be evaluated and it should be assured that the patients receive proper somatic healthcare during the forensic psychiatric treatment and that it continues also in the outpatient setting.

Keywords: mortality, forensic psychiatry, suicide

Background

It is known that all types of mental disorders increase the risk of premature death [1]. In a 17-year follow-up study of the Finnish general population, it was shown that suffering from any mental disorder was associated with a significant risk of premature death, with a relative risk of 1.6 for men and 1.4 for women [2]. The excess mortality was due to cardiovascular diseases, respiratory diseases and suicides in both genders and in men also due to non-suicidal injuries. A psychiatric case register study conducted in Finland, Denmark and Sweden monitored recent onset patients with a psychiatric disorder admitted to psychiatric hospital treatment [3]. The study group included 7953 Finnish schizophrenia spectrum patients, 834 of whom died during the study period resulting in an overall Standardized Mortality Ratio (SMR) of 2.9. The SMR for deaths due to diseases was 2.6, for suicides it was much higher, 12.5, and for other external causes it was found to be 3.0.

We detected increased mortality among forensic psychiatric patients in Finland in our previous study, with an SMR 3.0 when compared to the general population [4], but cause-specific mortality among forensic psychiatric patients has been rarely evaluated. In a study that consisted of 595 patients admitted in a medium secure unit in England, the overall SMR was 6.0 [5]. The SMR for deaths due to diseases was 3.1, for suicides 32.3 and for other external causes 19.0. In another English study examining 5955 patients admitted to high security hospitals, the SMR for suicides among male patients was 6.6 and for female patients 40.1 during their hospital treatment [6]. After discharge from the hospitals, the SMR for suicides among male patients was 23.3 and among female patients 44.9. In a Swedish study consisting of 88 patients who were discharged from a forensic psychiatric treatment, the SMR was 9.2 among male patients and 40.5 among female patients [7]. Of these deaths 55% were due to somatic diseases, 30% due to suicide, 10% were suspected suicides and 5% were due to the consequences of substance abuse.

In a meta-analysis of eight publications reporting mortality and two additional studies concentrating

solely on suicides, the all cause crude death rates (CDRs) of forensic psychiatric patients ranged from 789 to 2828 per 100 000 person-years and the pooled estimate for all-cause CDR was 1538 [8]. The rate was noted to be similar to a figure in a study of psychosis patients with all-cause CDR of 1417 [9]. In contrast, they differed from the corresponding figures of released prisoners for whom the pooled estimate of all-cause CDR was 850 [10], suggesting that it is the mental illness rather than the forensic background that is responsible for the increased mortality risk among forensic psychiatric patients.

Aim

The purpose of this study was to analyze the causes of mortality among patients committed to compulsory forensic psychiatric hospital treatment in Finland during 1980–2009 by categorizing the causes of mortality into somatic diseases, suicides and other unnatural deaths. By revealing the causes of excess mortality, we intend to provide new knowledge in an effort to reduce the mortality gap between forensic psychiatric patients and the general population.

Materials and Methods

In Finland, a court decides if it is necessary to perform a forensic examination to assess the criminal responsibility of a defendant. The court may order a forensic examination to be performed if the defendant has been found guilty of a serious crime that may lead to a conviction of more than one year imprisonment or if the defendant requests the forensic examination. After the forensic examination, if the defendant is assessed as suffering from a serious mental disorder (psychosis) and due to this psychotic mental disorder considered to have been incapable to understand the true meaning of his/her actions and/or incapable to control his/her actions during the offence, he/she can

be exempted from legal punishment and be committed to compulsory forensic psychiatric hospital treatment. In the final stage of the hospital treatment, the patient can be released in a supervised leave although he/she will still be under compulsory treatment. Most of the forensic psychiatric patients are on this kind of a supervised leave prior to the discharge from the hospital. A supervised leave may last up to six months and these periods may be repeated if needed. After his/her ultimate discharge from the hospital, the psychiatric care is no longer mandatory and ex-forensic psychiatric patients are legally regarded in the same manner as other psychiatric outpatients with no obligatory follow up. In Finland, legislation does not allow for compulsory outpatient care for any psychiatric patient.

This study population consists of the patients committed to compulsory forensic psychiatric hospital treatment in Finland in the thirty year period from 1980 to 2009. The material for this study was gathered from the National Institute for Health and Welfare's (THL) archive, which includes data on all Finnish forensic psychiatric reports and the information of patients who have been committed to forensic psychiatric hospital treatment. During the years 1980–2009, 1253 patients were committed to forensic psychiatric hospital treatment in Finland. The majority of them were schizophrenia spectrum patients. The mean follow-up of these patients was 15.1 years (range 0.0–31.9 years), and it ended on 31.12.2011 or when the patient had died. The mean age of a patient at the time of the forensic examination was 37.5 years (range 15.4–82.9 years). For those patients who were discharged from the forensic psychiatric hospital treatment to the outpatient care (N=832), the mean duration of the hospital treatment was 5.9 years (range 0.1–29.1 years). For discharged male patients (N=723), the mean forensic psychiatric hospital treatment duration was 6.1 years (range 0.1–29.1 years) and the corresponding value for female patients (N=109) was 4.8 years (range 0.1–19.9 years).

In order to define the mortality among patients in the study group, they were linked to the national death register of the Statistics Finland, which contains information about all deaths in Finland. Depending on the cause of death stated in the patients' death certificates, these were categorized into somatic diseases, suicides, accidents and homicides. The SMR was calculated in each section and in an effort to increase statistical power, violent deaths i.e. accidents and homicides, were combined in the same section. The SMR was calculated as the ratio of observed and expected number of deaths by using subject-years methods with 95% confidence intervals, assuming a Poisson distribution. The expected number of deaths was calculated on the basis of sex-, age- and calendar-period-specific mortality rates in the Finnish population.

This study was a part of the transnational After Care project. Ethics committee approvals for the study were obtained from the Research Ethics Committees of Kuopio, Oulu and Turku Universities, Kuopio, Helsinki and Turku University Hospitals, Health Centre of City of Helsinki, Hospital District of Southern Savo, and The Hospital District of Pirkanmaa. This study was approved and the study material gathered from the Finland's National Institute for Health and Welfare and by Statistics Finland. This study was purely registry based and no contacts were made with the subjects of the study.

Results

During the follow-up, a total of 351 patients died. The vast majority of deaths (249, 79%), were attributable to somatic diseases. Fifty nine deaths (16.8%) were due to suicides, 32 (9.1%) deaths were accidental and four patients (1.1%) were victims of homicides. For 7 patients, the cause of death remained indefinite even after the forensic autopsy and it had therefore been classified as

unclear in their death certificate. The causes of deaths are presented in Table 1. The SMRs and mean ages at death are presented in Table 2, excluding the 7 unclear deaths.

Of the 59 suicide deaths, 31 (52.5%) suicides were committed during the forensic psychiatric hospital treatment (median 2.1 years in treatment, range 0.1–14.2 years) and 28 (47.5%) suicides were committed after the discharge from the hospital (median 3.4 years after the discharge, range 0.1–17.3 years). The associations between the suicides and time in forensic psychiatric hospital treatment or time after the discharge from the hospital are shown in Figure 1.

Of the 249 deaths due to somatic diseases, 61 (24.5%) deaths occurred during the forensic psychiatric hospital treatment (median 4.2 years in treatment, range 0.02–24.1 years) whereas after hospital discharge, there were 188 (75.5%) of these types of deaths (median 8.7 years after the discharge, range 0.1–27.7). The associations between deaths due to diseases and time in the forensic psychiatric hospital treatment or time after the discharge from the hospital are presented in Figure 2.

Of the 4 homicides, 1 occurred during the forensic psychiatric hospital treatment (1.2 years in treatment) while the patient was on an approved leave from the hospital. The other three homicides happened after discharge from the hospital (median 7.4 years after the discharge, range 1.5–12.6 years).

With respect to the 32 accidental deaths, 3 male deaths occurred during the forensic psychiatric hospital treatment (median 7.7 years in treatment, range 2.0–19.1 years) and 29 accidental deaths occurred after the discharge from the hospital (median 7.3 years after the discharge, range 0.9–20.2 years).

Conclusions

This study revealed that although the majority of the mortality among forensic psychiatric patients in Finland can be traced to somatic diseases, the major difference to the general population is that a forensic psychiatric patient was seven times more likely to commit suicide. Furthermore, on average, the suicide deaths or those caused by other unnatural causes occurred at a younger age and therefore caused more life years lost.

When the results of this study are compared to previous reports, it should be noted that the composition of the study populations may be very different e.g. is the study population made up of patients committed to be treated in forensic psychiatric hospital after criminal behavior or is it patients from community that are admitted for serious symptoms but non-criminal behavior? In addition, the admission criteria for involuntary psychiatric treatment vary from country to country. For example, in some countries, a patient can be committed to psychiatric treatment if he/she is diagnosed with a psychopathic disorder, whereas in Finland, an adult patient in involuntary psychiatric treatment must be diagnosed to have a mental disorder with psychotic symptoms. When compared to the previous studies which have investigated the mortality among forensic psychiatric patients [5-7], the mortality is lower in this study; this might be a result of the larger study population and the differences between the study groups. It could be also that there are certain factors in Finnish forensic psychiatric treatment system that contribute to the lower mortality.

The overall mortality noted in this study among forensic psychiatric patients is identical with the mortality noted in a previous study of schizophrenia-spectrum patients in Finland [3]. This strengthens the proposal based on the previous meta-analysis [8] that it is the mental illness rather than the forensic background that is responsible for the increased mortality among forensic

psychiatric patients. The high mortality due to suicides among forensic psychiatric patients observed in our study is unacceptable, but it is also noteworthy that the mortality due to suicides, although higher than in the general population, is somewhat lower that reported in previous studies of forensic psychiatric patients [5-7] as well as among Finnish schizophrenia spectrum patients [3]. The difference between suicide mortality in our study and the previous forensic psychiatric patient studies is also likely not only to originate from differences between the study groups but also due to differences in treatment systems. For example, the difference in suicide mortality between the value found here and that of Finnish schizophrenia patients may be due to the former's prolonged duration of hospital treatment, which is likely to be a protective factor, since it is known that the suicide risk is higher among psychiatric patients who receive only a short hospital treatment [11].

Over half of the suicides in this study occurred during the forensic psychiatric hospital treatment which reveals an obvious treatment failure in these cases. There were excessive numbers of suicides during the first years in the forensic hospital treatment but as the treatment continued, the risk of suicide appeared to decline. It is known that psychiatric patients have an increased risk of suicide and the risk peak of suicide has been shown to occur during the first week after admission to hospital [11]. Here, it was found that in these forensic psychiatric patients, the risk of suicide remained elevated for years after admission. The excessive amount of suicides during first years may be attributable to remorse for the crime as well as difficulties in adjusting to their changed circumstances. It is not only during the episodes the psychoses but also during the time of recovery that the suicide risk may be elevated in forensic psychiatric patients. During the hospital treatment, more attention should be paid to factors that are known to increase the risk of suicide such as negative attitude towards treatment, impulsivity, prior suicide attempt, high IQ, depression and a family history of suicide [12]. In addition, it would be important to identify those factors that are known to decrease the risk, such as a safe ward environment, patient visibility and supervision,

careful assessment, teamwork and awareness of the risk of suicide within the hospital [13]. We recommend that there should always be a systematic investigation when a serious incident such as a suicide death occurs during the forensic psychiatric treatment.

The other risk peak for suicides among psychiatric patients is known to be in the first two weeks after hospital discharge [11, 14]. Also in this respect, it was shown here that among forensic psychiatric patients, the high risk for suicide continued for years after the forensic psychiatric hospital treatment had ended. After the first years, the numbers of suicides seemed to moderate but it did seem to increase again many years after the release. The high suicide risk after the discharge from hospital may be attributable to the withdrawal of the protective factors of the treatment and difficulties in adjusting back to everyday life. Over a longer time period, the risk of suicide may again increase because of a re-occurrence of the mental disease and inadequate outpatient care. Since at this point, forensic psychiatric patients in Finland are treated as other psychiatric patients, the development of community based modern, effective and multifaceted services could be one way to avoid these suicides [15]. When organizing the outpatient care, factors known to decrease the risk of suicide should be considered e.g. withdrawing the intensive care only gradually and planning of seamless access to mental health services and useful daily activation [12, 14].

Mortality due to unnatural deaths other than suicides was not as high when compared to the standard population (SMR 1.7) and since there was only one female death in this group, the value for women is unreliable (SMR 1.3; 95% CI 0.2–8.9). These deaths were more common after the discharge from the forensic psychiatric hospital treatment, which could be due to many reasons e.g. loss of the protective factors available in the hospital, lack of compliance, as well as relapse of the mental disorder. In addition, a possible cognitive deficiency associated with the mental disease as well as the adverse effects of medication are likely to increase the risk of accidents. Patients with

mental disorders are known to have a highly elevated risk of an accidental death, with excessive alcohol consumption and other substance use disorders being the strongest risk factors [16].

Not unexpectedly, the percentual occurrence of deaths caused by somatic diseases increased over the course of time of this study. The numbers of these deaths would almost inevitably increase if the follow-up had been longer, since death due to a somatic disease is a natural end point unless the patient commits suicide, or is homicide victim or is involved in a fatal accident. This means that the percentual occurrence of unnatural deaths is overrepresented since only part of the study group had died by the end of the follow-up. The SMR of 2.6 estimated in this study still reveals the excess mortality due to somatic diseases among forensic psychiatric patients and it is similar to the mortality due to diseases in non-forensic Finnish schizophrenia patients [3]. It is known that many physical illnesses are more common among patients suffering a severe mental illness. Poor dietary habits, lack of exercise, smoking and adverse effects of medications are some of the factors known to be implicated in the excess mortality [18, 19]. It is also recognized that psychiatric patients are less likely to receive proper treatment for somatic diseases [20]. In this study, the majority of deaths due to somatic diseases occurred after the discharge from the hospital treatment. This can in part be due to the healthcare provided and more healthy lifestyle when they were receiving the (compulsory) treatment in the forensic psychiatric hospital. The increased mortality due to somatic diseases after discharge could be partly a consequence of the withdrawal of these protective factors and possibly to subsequent difficulties in receiving the proper out-patient care. During the year 2011, three major causes of death in Finland were- 1) diseases of circulatory system (40% of deaths), 2) cancer (24%) and 3) diseases of respiratory system (4%) [17]. The percentual occurrence of these causes of deaths among forensic psychiatric patients in this study was similar i.e. 1) deaths due to diseases of circulatory system (31%), 2) cancer (18%); it should be noted that these causes of deaths would most likely increase if we employed a longer follow-up. The deaths due to diseases of

respiratory system (8%) were slightly more common in our psychiatric patients already at this point which could be a consequence of their frequent smoking habits.

The strengths of our study are the large sample of forensic psychiatric patients and the mean follow-up time of 15.1 years, the possibility to use the death register of Statistics Finland that holds the cause of death register of citizens and permanent residents in Finland and the access to the Finnish system of death certificate forms, death certification practices and the standardized cause of death validation procedure that have been shown to serve as a solid background in epidemiological studies on mortality [21]. The weakness of this study is that after the patients were discharged from the forensic psychiatric hospital treatment, there is no knowledge of their involvement in outpatient care or their use of medication. In addition, substance disorders are known to increase mortality of psychiatric patients [22, 23] and in this study group substance use disorders were not evaluated as a variable. This calls for further studies to research the proportion of substance use disorders as a factor causing increased mortality among forensic psychiatric patients.

The results of this study emphasize that the high risk of suicide should be noted not only during the hospital treatment of forensic psychiatric patients but also when the outpatient care is being organized. The risk of accidents should be evaluated and it should be assured that the proper somatic healthcare continues also in the outpatient setting. The excess mortality in forensic psychiatric patients with a criminal background and severe mental illness highlights why support and care should be targeted to these patients both during their stay in hospital and after their discharge. After all, a civilization is measured by how it treats its weakest members.

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References

[1] Harris EC, Barraclough B. Excess mortality of mental disorder. Br J Psychiatry 1998;173:11-53.

[2] Joukamaa M, Heliövaara M, Knekt P, et al. Mental disorders and cause-specific mortality. Br J Psychiatry 2001;179:498-502.

[3] Nordentoft M, Wahlbeck K, Hällgren J, et al. Excess mortality, causes of death and life expectancy in 270,770 patients with recent onset of mental disorders in Denmark, Finland and Sweden. PLoS One 2013;8(1):e55176. doi: 10.1371/journal.pone.0055176

[4] Ojansuu I, Putkonen H, Tiihonen J. Mortality among forensic psychiatric patients in Finland. Nord J Psychiatry 2015;69(1):25-27. doi: 10.3109/08039488.2014.908949

[5] Davies S, Clarke M, Hollin C, et al. Long-term outcomes after discharge from medium secure care: a cause for concern. Br J Psychiatry 2007;191:70-74.

[6] Jones RM, Hales H, Butwell M, et al. Suicide in high security hospital patients. Soc Psychiatry Psychiatr Epidemiol 2011;46(8):723-731. doi: 10.1007/s00127-010-0239-6

[7] Tabita B, de Santi MG, Kjellin L. Criminal recidivism and mortality among patients discharged from a forensic medium secure hospital. Nord J Psychiatry 2012;66(4):283-289. doi: 10.3109/08039488.2011.644578

[8] Fazel S, Fiminska Z, Cocks C, et al. Patient outcomes following discharge from secure psychiatric hospitals: systematic review and meta-analysis. Br J Psychiatry 2016;208(1):17-25. doi: 10.1192/bjp.bp.114.149997

[9] Dutta R, Murray RM, Allardyce J, et al. Mortality in first-contact psychosis patients in the U.K.: a cohort study. Psychol Med 2012;42(8):1649-1661. doi: 10.1017/S0033291711002807

[10] Zlodre J, Fazel S. All-Cause and External Mortality in Released Prisoners: Systematic Review and Meta-Analysis. Am J Public Health 2012;102(12):e67-75. doi: 10.2105/AJPH.2012.300764

[11] Qin P, Nordentoft M. Suicide risk in relation to psychiatric hospitalization: evidence based on longitudinal registers. Arch Gen Psychiatry 2005;62(4):427-432.

[12] De Hert M, McKenzie K, Peuskens J. Risk factors for suicide in young people suffering from schizophrenia: a long-term follow-up study. Schizophr Res 2001;47(2-3):127-134.

[13] Sakinofsky I. Preventing suicide among inpatients. Can J Psychiatry 2014;59(3):131-140.

[14] Meehan J, Kapur N, Hunt IM, et al. Suicide in mental health in-patients and within 3 months of discharge. National clinical survey. Br J Psychiatry 2006;188:129-134.

[15] Pirkola S, Sund R, Sailas E, et al. Community mental-health services and suicide rate in Finland: a nationwide small-area analysis. Lancet 2009;373(9658):147-153. doi: 10.1016/S0140-6736(08)61848-6

[16] Crump C, Sundquist K, Winkleby MA, et al. Mental disorders and risk of accidental death. Br J Psychiatry 2013;203(3):297-302. doi: 10.1192/bjp.bp.112.123992

[17] Suomen virallinen tilasto (SVT) Kuolemansyyt [internet]. ISSN=1799-5051. Liitetaulukko 1a. Kuolleet peruskuolemansyyn (54-luokkainen luokitus) ja iän mukaan 2011, molemmat sukupuolet. [cited 2017 Jul 10]. Available from: http://www.stat.fi/til/ksyyt/2011/ksyyt_2011_2012-12-21_tau_001_fi.html

[18] Brown S, Birtwistle J, Roe L, et al. The unhealthy lifestyle of people with schizophrenia. Psychol Med 1999;29(3):697-701.

[19] Osborn DP, Nazareth I, King MB. Physical activity, dietary habits and Coronary Heart Disease risk factor knowledge amongst people with severe mental illness: a cross sectional comparative study in primary care. Soc Psychiatry Psychiatr Epidemiol 2007;42(10):787-793.

[20] De Hert M, Cohen D, Bobes J, et al. Physical illness in patients with severe mental disorders. II. Barriers to care, monitoring and treatment guidelines, plus recommendations at the system and individual level. World Psychiatry 2011;10(2):138-151.

[21] Lahti RA, Penttilä A. The validity of death certificates: routine validation of death certification and its effects on mortality statistics. Forensic Sci Int 2001;115(1-2):15-32.

[22] Steingrímsson S, Sigurdsson MI, Aspelund T, et al. Total population-based study of the impact of substance use disorders on the overall survival of psychiatric inpatients. Nord J Psychiatry 2016;70(3):161-6.

[23] Hjorthøj C, Østergaard ML, Benros ME, et al. Association between alcohol and substance use disorders and all-cause and cause-specific mortality in schizophrenia, bipolar disorder, and unipolar depression: a nationwide, prospective, register-based study. Lancet Psychiatry 2015;2(9):801-8.

Figure 1. Percentual occurrence of suicides during time (years) in forensic psychiatric treatment and time after discharge.

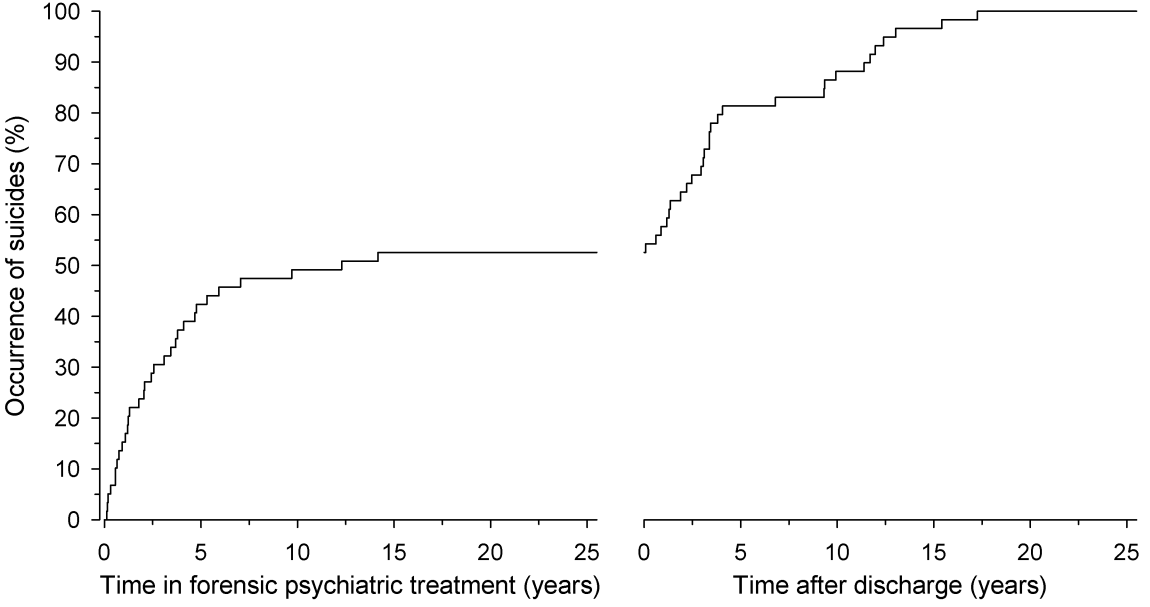
Figure 2. Percentual occurrence of deaths due to diseases during time (years) in forensic psychiatric treatment and time after discharge.

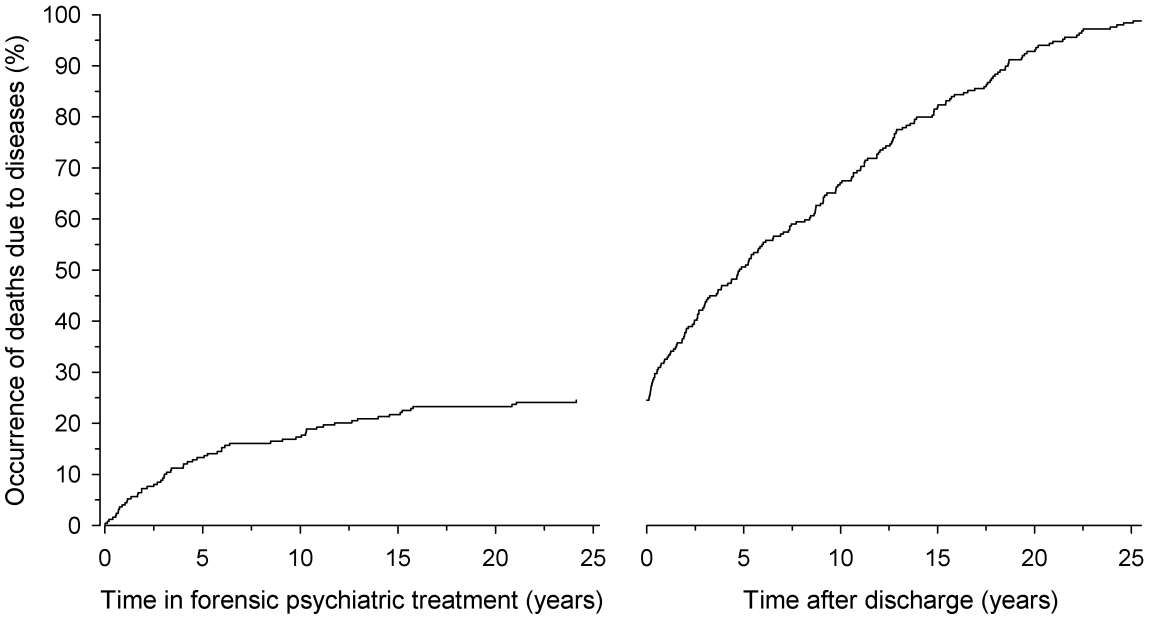
Table 1. The numbers and -proportion of deaths due to different causes

Cause of death	N	%
Somatic disease	249	71.0
· Heart and circulatory system diseases	110	31.3
· Respiratory system diseases	30	8.6
· Cancer diseases	63	18.0
· Other somatic diseases	46	13.1
Suicide	59	16.8
· Suicide by hanging	27	7.7
· Suicide by drug overdose	15	4.3
· Suicide by jumping from a height	6	1.7
· Suicide by drowning	4	1.1
· Suicide by other means	7	2.0
Unnatural cause of death other than suicide	36	10.3
Homicide	4	1.1
Accidental death	32	9.1
Cause of death unclear	7	2.0
All causes of death	351	100

Table 2. SMRs and mean ages (years) at the time of death of the deceased patients

	All	Male	Female
Deaths (N)	351	318	33
· age (range)	56.2 (19.8–87.8)	56.1 (20.3–87.8)	57.0 (19.8–84.3)
Suicides (N)	59	53	6
· age (range)	40.2 (19.8–76.7)	41.3 (21.0–76.7)	30.7 (19.8–38.0)
· SMR (95% CI)	7.1 (5.5–9.2)	6.6 (5.1–8.7)	19.5 (8.8–43.4)
Diseases (N)	249	223	26
· age (range)	61.1 (20.3–87.8)	60.7 (20.3–87.8)	64.1 (43.3–84.3)
· SMR (95% CI)	2.6 (2.3–2.9)	2.5 (2.2–2.9)	3.1 (2.1–4.6)
Accidents (N)	32	31	1
· age (range)	51.9 (32.2–81.8)	52.5 (32.3–81.8)	32.2 (32.2–32.2)
Homicides (N)	4	4	0
· age (range)	39.5 (32.8–50.8)	39.5 (32.8–50.8)	
Accidents and homicides (N)	36	35	1
· SMR (95% CI)	1.7 (1.2–2.4)	1.8 (1.3–2.5)	1.3 (0.2–8.9)


Occurrence of suicides (%)
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
Time in forensic psychiatric treatment (years)
0
5
10
15
20
25
Time after discharge (years)


Occurrence of deaths due to diseases (%)
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
Time in forensic psychiatric treatment (years)
0
5
10
15
20
25
Time after discharge (years)